Book Reviews.

STUDIES ON THE LESIONS PRODUCED BY THE ACTION OF CERTAIN POISONS ON THE CORTICAL NERVE CELL. By Henry J. Berkley, M.D., Johns Hopkins Hospital Reports, Vol. VI., No. 1, Report in Neurology, No. 3.

In this series of papers Berkeley has studied the changes produced in the pyramidal cells of the cerebral cortex and in the Purkinje cells of the cerebellar cortex, in experimental poisoning by alcohol, serum, ricin and hydrophobia in animals, and has compared these with pathological changes found in alcohol poisoning in man. He has employed the Golgi stain which he considers of value in pathological investigations. He precedes his record of results by a careful account of the methods of staining employed, and throughout the studies compares carefully normal control sections with pathological sections. He considers the subject of artefacts and physiological variations from the normal, but concludes that there are a large number of cells in alcoholic brains that are distinctly abnormal. In the pyramidal cells there were found a distinct diminution in size, a shrinkage of a vast majority of the cortical cells particularly in the outspread of the branches, certain swellings of the dendritic processes with disappearance of the gemmules and roughening of the larger processes and to a less extent of the cell body. One out of every three or four nerve elements in the brain of the three alcoholic rabbits examined showed departures from the normal in some form. The tumefactions upon the dendritic process are irregular in size and are more numerous far away from the cell. The gemmules fall off from the process at a distance from the cell, but in extreme cases the entire dendritic process may be destitute of these gemmules. Changes in the cell body of the nature of disintegration producing defects so that the body looks as if a portion of its substance had been scooped out down to the region of the nucleus were observed. No morbid alteration could be detected in the axis cylinders of the cortex. The same alterations were found in the Purkinje cells of the cerebellum though the changes were more prominent from their intensity. The loss of the gemmules was very striking because of their greater luxuriance upon the dendritic branches of these cells.

Berkley also calls attention to the changes in the blood vessels visible in nuclear stains in acute alcohol poisoning. He says (page 34): "the changes in the muscularis of the arteries are especially interesting. Nuclei are now and then absent from areas of the median wall of the vessel, and in those that remain certain abnormalities are apparent; one-half of a nucleus being understained, presenting the appearance of a vacuole, while in the other portion the chromatin particles take the stain fairly well, and the karyoplasm also receives a portion of the dye. The nuclear membrane surrounding the entire nucleus is distinct and stained. But it is in the substance of the muscular protoplasm that the lesions are more apparent and show that the cells are undergoing a retrogressive process. They no longer have their substance clearly stained. The protoplasm, too, is considerably swollen, and its receptive qualities to the dye is no longer good. The lymphatic spaces are obliterated, the outer lamina of the vessel being pressed closely against the limiting membrane of the perivascular sheath." In the veins collections of white blood corpuscles filling the interior and penetrating the walls and filling the perivenous spaces were frequently observed, and all the leucocytes within and without the vessels showed more or less evidence of degeneration. He concludes that these changes in the circulation are important factors in alcohol poisoning. But while he admits that there is a direct action of the alcohol upon vasoconstrictor and vasodilator nerves in the body, he agrees with other observers in failing to find any vascular nerves in the blood vessels of the brain, and concludes that the mechanism controlling the cortical arteries is different from that in other portions of the body, the muscular cells being less directly under the influence of nerve control. Hence the effects of alcohol on the brain are greater than upon other parts of the body. For muscular cells under the influence of the direct action of the poison are free from any power to urge them to contract after the immediate effect of the toxic substance is passed, and therefore remain for a long time inert; the congestion of the cerebral tissue is long continued, larger amounts of poisoned blood pass through the brain, and incidentally a greater portion of alcohol is brought to the brain than to other tissues, the deteriorated serum is transuded in increased quantities; it is carried into the lymph spaces surrounding the cerebral cells, their structures are bathed in diluted alcohol and soon undergo degeneration. The formation of the many thrombotic plugs of lymphoidal elements is very remarkable and interesting, as is also the emigration of these corpuscles through the vascular walls. This study, therefore, shows that poisoning with alcohol produces decided lesions both of the blood vessels and of the nervous elements of the cerebral cortex.

In the studies upon serum poisoning in dogs, changes of somewhat similar kind were found in the pyramidal cells, namely, an increasing number of swellings upon the dendrites, a disappearance of the gemmulæ from the branches of the dendrites, a loss of the finest branches of the dendrites, especially within the limits of the molecular layer where these dendrites come into contiguity with the terminations of the nerve fibres, and end-apparatus of all descriptions belonging to the several classes of nerve fibres terminating there. Berkley believes that it is the function of these gemmules on the dendrites to gather impulses from the terminating brushes surrounding them, and hence that the loss of these gemmules destroys the functions of the nerve cells.

The changes observed in ricin poisoning are of very much the same nature, as are also the changes in hydrophobic toxæmia. These studies are accompanied by a large number of very beautiful drawings of the pathological changes described, and by a number of microphotographs which supplement and confirm the drawings.

In Part V. the pathological alterations in the nuclei and nucleoli of the nerve cells from the effects of alcohol and ricin poisoning are studied by means of the Nissl methods.

To these studies is added an interesting sketch of the intracerebral nerve fibre terminal apparatus and of the probable modes of transmission of the nerve impulses; in which Berkley shows that it is only at the free bulbous termination of the nerve filaments that we have naked protoplasm, as everywhere else some protective sheath can be demonstrated. This proves that only at a few points can the nerve forces discharge themselves from the axons to the protoplasm of other cells, these points being at the terminal arborization of the nerve filaments. The gemmulæ upon the dendrites are the only parts of the dendritic process that also present naked protoplasm; hence Berkley concludes that it is by means of the terminal bulbous extremity of the brush and the gemmulæ of the dendrite that the nervous impulses pass from one cell to another. The report closes with an interesting record of a case of asthenic bulbar paralysis, with a bibliography of this disease.

This work should be carefully studied by everyone who is interested in the pathology of the brain. Its bearings upon the symptoms of alcoholic dementia has been already developed by the author in other articles.

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